

On Terms

RESPONSE COST: A CASE FOR SPECIFICITY¹

Stephen C. Luce, Walter P. Christian,
Lee E. Lipsker and R. Vance Hall
The May Institute for Autistic Children, Inc.
The University of Kansas

Weiner (1962) first used the term "response cost" (RC) to describe a contingency in which a subject's response resulted in the backward step of an automated point counter. In a series of experiments, Weiner (1963, 1964, 1965a, 1965b, 1969) demonstrated the effectiveness of this procedure in decreasing the rate of the response upon which it was contingent. Azrin and Holz (1966) also used the term RC to refer to the "subtraction of points as a consequence" (p. 392). Similarly, Phillips, Phillips, Fixsen, and Wolf (1971) described their contingent point loss procedures with delinquent youth as being comparable to the RC procedures used by Weiner (1969).

However, a review of the literature in applied behavior analysis suggests that the terminological consistency of the early RC studies has not been maintained in more recent research. For example, Sulzer and Mayer (1972) defined RC as "the contingent withdrawal of specified amounts of reinforcers" (p. 161), a definition which remained essentially unchanged in Sulzer-Azaroff and Mayer (1977). Kazdin (1972) apparently expanded the Sulzer-Azaroff and Mayer definition to include "physical cost or effort" (p. 533), and later Kazdin (1975)

discussed overcorrection and contingent point loss under the general heading of RC. Hall (1975) further expanded the Kazdin (1972, 1975) definitions to include "procedures . . . that require changes in behavior" as well as "behavioral requirements (that) are increased or changed in order to obtain reinforcers" (p. 38).

It seems, therefore, that while there is general agreement among behavior analysts concerning the potential response decreasing effect of the various RC contingencies, that there is considerable disagreement concerning the specific operations involved in their application. Given the frequent use of the term RC in textbooks and in the research literature, and the importance of specificity in applied behavior analysis (Baer, Wolf, & Risley, 1968; Skinner, 1938), there is both need and precedent (Michael, 1975) for improving terminology when it is found to be imprecise.

To determine the degree to which prominent behavior analysts are consistent in their understanding and use of the term RC, a study was conducted.

SURVEY OF USE OF "RESPONSE COST"

A sample of 68 individuals identified as editors, associate editors, and members of

¹Reprints of this paper may be obtained from Stephen C. Luce, Ph.D., The May Institute for Autistic Children, Box 703, 100 Sea View Street, Chatham, MA 02633. The authors would like to thank Beth Sulzer-Azaroff, Israel Goldiamond, and Joseph Delquadri for their helpful comments, and Patricia Leidholt and Susan Thibadeau for their assistance in the preparation of this manuscript.

²Although the survey letter sent out stated "all persons who have served on the editorial board of the Journal of Applied Behavior Analysis, Volumes 1-11," it was in fact sent only to a randomly selected sample. In the opinion of the authors, this inadvertent discrepancy neither biased those being surveyed nor influenced the interpretation of the results.

The May Institute for Autistic Children, Inc.

BOX 703, 100 SEA VIEW STREET, CHATHAM, MASS. 02633

TEL. 617-945-1147

WALTER P. CHRISTIAN, PH.D.
DIRECTOR

April 9, 1979

Dear Colleague:

A recent review of applied behavior analysis literature indicates a lack of consistency among behavior analysts concerning the definition of RESPONSE COST. In an attempt to standardize the use of the term RESPONSE COST, we are surveying the opinions of our colleagues on the definitions they prefer. We would appreciate your opinion.

Our survey sample consists, at this time, of all persons who have served on the editorial board of the *Journal of Applied Behavior Analysis*, Volumes 1-11.

We have listed brief descriptions of what appear to be the two most prevalent definitions. Please indicate which of the following definitions most closely approximates your own working definition. Space has been provided for more detailed and/or personal definitions. An addressed, stamped envelope is provided for your reply.

-
1. RESPONSE COST is the response--contingent removal of a specified amount of reinforcement. Specific procedures included under this definition are: contingent point loss, contingent token loss, and fines.
 2. RESPONSE COST includes the response--contingent removal of a specified amount of a reinforcer and procedures which require a person to engage in a specified activity contingent upon the emittance of an undesired response. Specific procedures included under this definition are: contingent point loss, contingent token loss, fines, overcorrection, positive practice, contingent exercise, and contingent observation.
 3. _____

We sincerely thank you for your participation.

Lee E. Lipsker
Stephen C. Luce
Walter P. Christian

Fig. 1. The one-page letter and questionnaire sent to 68 randomly selected individuals identified as editors, associate editors, and members of the Board of Editors of the *Journal of Applied Behavior Analysis*.

the Board of Editors of the *Journal of Applied Behavior Analysis* was randomly selected from a list of 137 persons serving in those positions between 1968 and 1978 (Volumes 1-11).² The one-page letter and questionnaire presented in Figure 1 was sent to these individuals with a self-addressed, stamped envelope.

Two observers independently rated the comments of each survey by assigning each response to one of three categories: (1) Definition 1 (most similar to Sulzer-Azaroff & Mayer, 1977); (2) Definition 2 (most similar to Kazdin, 1972, 1975; and Hall, 1975); or (3) those responses that were not clearly identified as either

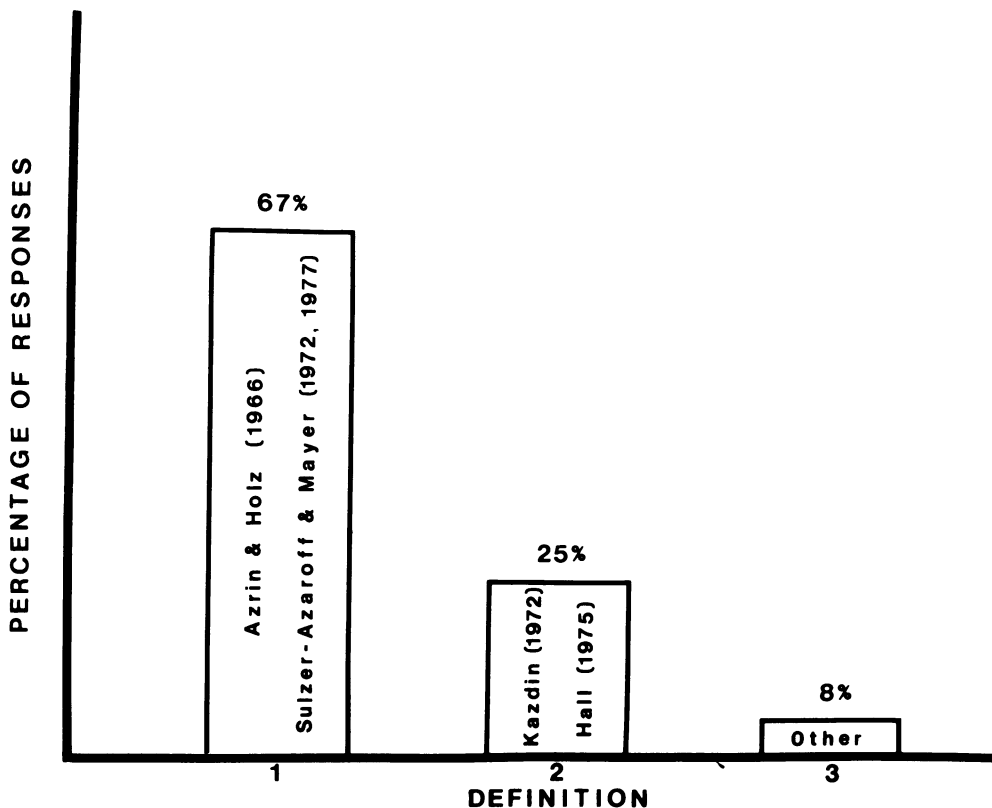


Fig. 2. The percentage of returned surveys with definitions falling into each of the three categories.

Definition 1 or 2. Except for a number assigned to each questionnaire as it was received from the sample surveyed, no other marks were made on the questionnaire prior to or during an observer's rating.

Point-by-point interobserver agreement was determined by dividing the number of surveys where the two observers agreed in their category rating by the total number of surveys. Interobserver agreement was found to be 97.4%.

Thirty-nine, or 57.4%, of the individuals sampled returned completed surveys. Figure 2 presents the percentage of the surveys indicating each of the two definitions.

In 15 cases, individuals used the space provided on the questionnaire for alter-

nate definitions or elaborations of Definitions 1 or 2. Of these cases, most added information in the comments section emphasizing the suppressive effect of the procedure on the target behavior. A phrase such as "leading to a decrease in the probability of that response" was a frequent comment.

Definition 1, which most closely resembled that of Sulzer-Azaroff and Mayer (1977), was the choice of 67% of those responding to the survey; 25% favored the broader second definition which most closely resembled that of Kazdin (1972) and Hall (1975). In addition, there were three cases (8%) in which definitions were listed in the comments section of the questionnaire which were rated by observers as not identifiable as

either Definition 1 or 2.

DISCUSSION

The results of this study suggest that there is disagreement among even the most distinguished applied behavior analysts concerning the use of the term RC. In most cases, the definitions preferred by the participants were similar to one of two prominent definitions for RC and observers apparently had no difficulty categorizing their responses. However, as the results suggest, occasionally a participant was unclear as to the proper categorization of his/her response.

Thus it might be argued that given the wide variety of operations that have been labeled RC, and the absence of any operational similarity across these procedures (e.g., withdrawal of a reinforcer versus physical effort), the utility of RC as a descriptive term is questionable.

Investigators and students in applied behavior analysis therefore might prefer to specify the actual operations involved in the "RC" contingency. The following are examples of operationally specific terms that could be used to define what appear to be distinctly different operations: (1) Contingent reinforcement loss; (2) contingent effort; and (3) response requirement. Most of the procedural variations which have appeared in the literature could be categorized as being forms of these operations.

Contingent reinforcement loss refers to a group of procedures that reduces the probability of a response by removing a portion of reinforcement contingent upon a response. It has, in some cases, been the only procedure considered under the heading of response cost (Azrin & Holz, 1966; Sulzer-Azaroff & Mayer, 1977). The most extensively researched form of contingent reinforcement loss involves the removal of an amount of secondary reinforcement such as points or tokens (e.g., Phillips, 1968). In most cases the points or tokens removed were backed by other reinforcers, but there were exceptions,

(e.g., Hall, Axelrod, Foundopoulos, Shellman, Campbell, & Cranston, 1971).

Contingent effort describes a group of procedures that requires some "physical cost or effort" (Kazdin, 1972) contingent upon inappropriate behavior with a resulting decrease in that behavior. The most prevalent example of contingent effort in the literature is referred to as "overcorrection" (Foss & Azrin, 1973). Following an inappropriate response, a person is required to restore the environment to a state which exceeds its condition before the disruptive act ("overcorrection") and/or to engage in repeated practice of an appropriate alternate response ("positive practice"). Other examples of contingent effort include forms of negative practice (Azrin & Nunn, 1973; Dunlap, 1932), contingent exercise (Luce, Delquadri, & Hall, 1980), and other forms of effort that are not topographically related to the response being reduced (c.f. Epstein, Doke, Sajwaj, Sorrell, & Rimmer, 1974; Porterfield, Herbert-Jackson, & Risley, 1976; Sailor, Guess, Rutherford, & Baer, 1968).

Response requirement, the third group of procedures, has been included by some under the heading of RC (e.g., Hall, 1975; Wallen, Hauserman, & Levin, 1977). As described by Jacobson, Bushell, and Risley (1969), response requirement decreases behavior by increasing the amount of effort required for reinforcement. Jacobson et al. (1969) reduced the number of activity switches exhibited by preschoolers by requiring the children to perform a task before switching activities. Another example of this procedure can be seen in contingencies such as paper towel dispensers which require the user to repeatedly turn little cranks or push buttons while extracting minute pieces of paper. Examples from the animal research literature include increasing the friction of the manipulandum to decrease response rates (Azrin, 1958; Skinner & Morse, 1958) and increasing the number of responses required to switch schedules

to decrease switching on a concurrent schedule (Findley, 1958). Careful study of response requirement is needed to determine the extent of its applicability in applied settings.

The use of operationally specific terms, such as those described above, may have more than one advantage for behavior analysts. First, as previously discussed, such operational specificity would lead to more precise communication among investigators and less confusion concerning the use of the term RC. Secondly, specification of the exact operation might result in increased applied research on these procedures. For example, forms of contingent effort topographically dissimilar to a target behavior could be operationally specified. Similarly, more research is needed on contingent reinforcement loss when reinforcers other than points or tokens are used.

These three terms, contingent reinforcement loss, contingent effort, and response requirement describe procedures that have been proven effective in decreasing behavior. In addition, they represent mild alternatives to procedures such as time-out and painful consequences which, although effective and well researched, are often deemed unacceptable in many settings. It is hoped that the move toward operational specificity proposed here will better enable behaviorists to develop procedures that effect behavior change while remaining consistent with the current trend toward the use of socially acceptable procedures involving minimum restrictiveness.

REFERENCES

- Azrin, N. H. Some effects of noise on human operant behavior. *Journal of the Experimental Analysis of Behavior*, 1958, 1, 183-200.
- Azrin, N. H., & Holz, W. C. Punishment. In W. K. Honig (Ed.), *Operant behavior: Areas of research and application*. New York: Appleton-Century-Crofts, 1966.
- Azrin, N. H., & Nunn, R. G. Habit reversal: A method of eliminating nervous habits and tics. *Behaviour Research and Therapy*, 1973, 11, 619-628.
- Baer, D. M., Wolf, M. M., & Risley, T. R. Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis*, 1968, 1, 91-98.
- Dunlap, K. *Habits: Their making and unmaking*. New York: Liveright, 1932.
- Epstein, L. H., Doke, L. A., Sajwaj, T. E., Sorrell, S., & Rimmer, B. Generality and side effects of overcorrection. *Journal of Applied Behavior Analysis*, 1974, 7, 385-390.
- Findley, J. D. Preference and switching under concurrent scheduling. *Journal of the Experimental Analysis of Behavior*, 1958, 1, 123-144.
- Fox, R. M., & Azrin, N. H. The elimination of autistic self-stimulation by overcorrection. *Journal of Applied Behavior Analysis*, 1973, 6, 1-14.
- Hall, R. V. *Managing Behavior, Vols. 1-3*. Lawrence, Kansas: H & H Enterprises, 1975.
- Hall, R. V., Axelrod, S., Foundopoulos, M., Shellman, J., Campbell, R. A. & Cranston, S. S. The effective use of punishment to modify behavior in the classroom. *Educational Technology*, 1971, 11, 24-26.
- Jacobson, J. M., Bushell, D., Jr., & Risley, T. R. Switching requirements in a Head Start classroom. *Journal of Applied Behavior Analysis*, 1969, 2, 43-48.
- Kazdin, A. E. Response cost: The removal of conditioned reinforcers for therapeutic change. *Behavior Therapy*, 1972, 3, 533-546.
- Kazdin, A. E. *Behavior modification in applied settings*. Homewood, Illinois: Dorsey Press, 1975.
- Luce, S. C., Delquadri, J., & Hall, R. V. Contingent exercise: A mild but powerful procedure for suppressing inappropriate verbal and aggressive behavior. *Journal of Applied Behavior Analysis*, 1980, 13, 583-594.
- Michael, J. Positive and negative reinforcement, a distinction that is no longer necessary: or a better way to talk about bad things. In Ramp, E. & Semb, G. (Eds.) *Behavior analysis: Areas of research and application*. Englewood Cliffs, New Jersey: Prentice Hall, Inc., 1975.
- Phillips, E. L. Achievement Place: Token reinforcement procedures in a homestyle rehabilitation setting for "pre-delinquent" boys. *Journal of Applied Behavior Analysis*, 1968, 1, 213-224.
- Phillips, E. L., Phillips, E. A., Fixsen, D. L., & Wolf, M. M. Achievement Place: Modification of the behaviors of pre-delinquent boys within a token economy. *Journal of Applied Behavior Analysis*, 1971, 4, 45-60.
- Porterfield, J. K., Herbert-Jackson, E., & Risley, T. R. Contingent observation: An effective and acceptable procedure for reducing disruptive behavior of young children in a group setting. *Journal of Applied Behavior Analysis*, 1976, 9, 55-64.
- Sailor, W. S., Guess, D., Rutherford, G., & Baer, D. M. Control of tantrum behavior by operant techniques during experimental verbal training. *Journal of Applied Behavior Analysis*, 1968, 1, 237-244.

- Skinner, B. F. *Behavior of organisms*. New York: Appleton-Century-Crofts, 1938.
- Skinner, B. F. & Morse, W. H. Fixed-interval reinforcement of running in a wheel. *Journal of the Experimental Analysis of Behavior*, 1958, 1, 371-379.
- Sulzer, B., & Mayer, G. R. *Behavior modification procedures for school personnel*. Hinsdale, Illinois: Dryden Press, 1972.
- Sulzer-Azaroff, B. & Mayer, G. R. *Applying behavior analysis procedures with children and youth*. New York: Holt, Rinehart and Winston, 1977.
- Walen, S., Hauserman, N. M., & Lavin, P. J. *Clinical guide to behavior therapy*. Baltimore, Maryland: Williams & Wilkins, 1977.
- Weiner, H. Some effects of response cost upon human operant behavior. *Journal of the Experimental Analysis of Behavior*, 1962, 5, 201-208.
- Weiner, H. Response cost and the aversive control of human operant behavior. *Journal of the Experimental Analysis of Behavior*, 1963, 6, 415-421.
- Weiner, H. Response cost effects during extinction following fixed-interval reinforcement in humans. *Journal of the Experimental Analysis of Behavior*, 1964, 7, 333-335.
- Weiner, H. Real and imagined cost effects upon human fixed-interval responding. *Psychological Reports*, 1965, 17, 659-662. (a)
- Weiner, H. Conditioning history and manipulative human operant behavior, *Psychological Reports*, 1965, 27, 935-942. (b)
- Weiner, H. Controlling human fixed-interval performance. *Journal of the Experimental Analysis of Behavior*, 1969, 12, 349-373.